CLAIMS

What is claimed is:

1. A laser apparatus, comprising first and second reflectors defining a laser cavity, and a compensating member coupled to at least one of said reflectors and configured to thermally position one of said reflectors with respect to the other said reflector.

2. The laser apparatus of claim 1, wherein said compensating member is coupled to said first reflector and configured to position said first reflector with respect to said second reflector.

3. The laser apparatus of claim 1, further comprising a thermoelectric controller operatively coupled to said compensating member and configured to thermally adjust said compensating member.

4. The laser apparatus of claim 2, further comprising a gain medium having first and second output facets, said first output facet emitting a coherent beam along an optical path, said first reflector positioned in said optical path, said second output facet defining said second reflector, said first reflector and said second output facet defining said laser cavity.

5. The laser apparatus of claim 2, wherein said compensating member is thermally conductive.

6. The laser apparatus of claim 2, wherein said compensating member has a high coefficient of thermal expansion.

7. The laser apparatus of claim 4, wherein said gain medium and said first reflector are passively athermalized with respect to each other.

8. The laser apparatus of claim 1, further comprising:

(a) a detector associated with said external cavity and configured to detect losses associated with said external cavity; and

(b) a controller operatively coupled to said compensating element and said detector and configured to thermally adjust said compensating member according to error signals derived from said detector.

9. The laser apparatus of claim 8, further comprising a dither element operatively coupled to said laser cavity and configured to introduce a frequency modulation to said laser cavity.

10. An external cavity laser, comprising:

(a) a gain medium including first and second output facets, said gain medium emitting a coherent beam from said first output facet along an optical path;

(b) an end mirror positioned in said optical path, said end mirror and said second output facet defining an external cavity;

(c) a compensating member coupled to said end mirror; and

(d) a thermal controller coupled to said compensating member and configured to positionally adjust said end mirror by thermally controlling said compensation member.

11. The external cavity laser of claim 10, further comprising a grid generator positioned in said optical path before said end mirror;

12. The external cavity of claim 11, further comprising a channel selector positioned in said optical path before said end mirror.

13. The external cavity laser apparatus of claim 10, further comprising a base, said gain medium mounted on said base, said compensating member mounted on said base, said base having a first coefficient of thermal expansion, said compensating member having a second coefficient of thermal expansion, said base and said

compensating member being dimensioned and configured to passively athermalize said external cavity.

14. The external cavity laser apparatus of claim 12, further comprising a base, said gain medium, said grid generator, said channel selector and said compensator element mounted on said base, said compensating member having a first coefficient of thermal expansion said base having a second coefficient of thermal expansion, said base and said compensating member being dimensioned and configured to passively athermalize said external cavity.

15. The external cavity laser apparatus of claim 10, further comprising:

(a) a detector associated with said external cavity and configured to detect losses associated with said external cavity; and

(b) a controller operatively coupled to said compensating element and said detector and configured to thermally adjust said compensating member according to error signals derived from said detector.

16. The external cavity laser apparatus of claim 15, wherein said detector is a voltage detector positioned to monitor voltage across said gain medium.

17. The external cavity laser apparatus of claim 15, further comprising a dither element operatively coupled to said external cavity and configured to introduce a frequency modulation to external cavity.

18. The external cavity laser apparatus of claim 10, wherein said compensating member comprises a material having a high coefficient of thermal expansion.

19. The external cavity laser apparatus of claim 18, wherein said compensating member is thermally conductive.

20. An external cavity laser apparatus, comprising:

(a) a gain medium including first and second output facets, said gain medium emitting a coherent beam from said first output facet along an optical path;

(b) an end mirror positioned in said optical path, said end mirror and said second output facet defining an external cavity;

(c) a compensating member coupled to said end mirror, said compensating member having a first coefficient of thermal expansion;

(d) a thermal controller coupled to said compensating member and configured to positionally adjust said end mirror by thermally controlling said compensation member; and

(e) a thermally conductive base, said thermally conductive base having a second coefficient of thermal expansion, said gain medium coupled to said base, said thermal controller coupled to said base, said base and said compensating member being dimensioned and configured to passively athermalize said external cavity.

21. The external cavity laser apparatus of claim 20, further comprising:

(a) a detector associated with said external cavity and configured to detect losses associated with said external cavity; and

(b) a controller operatively coupled to said compensating element and said detector and configured to thermally adjust said compensating member according to error signals derived from said detector.

22. The external cavity laser apparatus of claim 21, wherein said detector is a voltage detector positioned to monitor voltage across said gain medium.

23. The external cavity laser apparatus of claim 21, further comprising a dither element operatively coupled to said external cavity and configured to introduce a frequency modulation to external cavity.

24. The external cavity laser apparatus of claim 20, wherein said compensating member comprises a material having a high coefficient of thermal expansion.

25. The external cavity laser apparatus of claim 24, wherein said compensating member is thermally conductive.

26. A method for operating a laser, comprising:

(a) providing first and second reflectors, said first and second reflectors defining a laser cavity; and

(b) adjusting said laser cavity by thermally adjusting a compensating member coupled to at least one of said reflectors.

27. The method of claim 26, wherein said thermally adjusting said compensating member comprises heating or cooling said compensating member with a thermoelectric controller coupled to said compensating member.

28. The method of claim 26, further comprising passively athermalizing said laser cavity.

29. The method of claim 26, further comprising monitoring losses associated with said laser cavity.

30. The method of claim 29, wherein said thermally adjusting is carried out according to error signals derived from said monitoring of said losses associated with said laser cavity.

31. The method of claim 29, further comprising introducing a frequency modulation into said laser cavity.

32. A method for generating a tunable coherent optical output, comprising:

(a) providing an external cavity laser having a gain medium with first and second output facets and emitting a coherent beam from said first output facet along an optical path, and an end mirror positioned in said optical path, said end mirror and said second output facet defining an external cavity; and

(b) adjusting said optical cavity by thermally adjusting a compensating member coupled to said end mirror.

33. The method of claim 32, wherein said thermally adjusting said compensating member comprises heating or cooling said compensating member with a thermoelectric controller coupled to said compensating member.

34. The method of claim 32, further comprising passively athermalizing said external cavity.

35. The method of claim 32, further comprising monitoring external losses associated with said external cavity.

36. The method of claim 35, wherein said monitoring comprising monitoring voltage across said gain medium.

37. The method of claim 35, further comprising introducing a frequency modulation into said external cavity.

38. The method of claim 35, wherein said thermally adjusting is carried out according to error signals derived from said monitoring of said frequency modulation introduced to said external cavity.

39. A laser apparatus, comprising:

(a) first and second reflectors defining a laser cavity; and

(b) means for thermally adjusting at least one of said reflectors.

40. The laser apparatus of claim 39, wherein said thermally adjusting means comprises a compensating member coupled to said reflector and configured to thermally position said reflector.

41. The laser apparatus of claim 40, wherein said thermally adjusting means further comprises a thermoelectric controller operatively coupled to said compensating member and configured to thermally adjust said compensating member.

42. The laser apparatus of claim 39, further comprising means for passively thermally stabilizing said laser cavity.